

Appl. No. : 10/759,925  
Filed : January 16, 2004

### REMARKS

Claims 1-12 and 15-22 are pending. Claims 1-12 and 15-22 stand rejected. Claims 1, 6, 12, and 22 are presently amended. Claims 1, 6, and 12 have been amended to recite that exposure of an aluminum alloy wall of the remote plasma discharge chamber to the materials in the chamber is part of the method. Support for this amendment can be found in the original claims and throughout the specification. For example, support can be found in paragraphs 0024, 0083, and 0115 of the published specification. Claim 22 has been amended to correct the claim for proper antecedent basis. Support for the claim amendment can be found throughout the specification and claims, for example, Claims 12, 13, 14, 20, and 22.

#### Indefiniteness Rejection

Claim 22 stands rejected as lacking sufficient antecedent basis for the term adhered silicon nitride deposits. Applicants thank the Examiner for the helpful comment and have amended Claim 22 so that it now has proper antecedent basis.

#### Rejection of Claims 1-8, 12, and 15-19 35 U.S.C. under §103(a) over EP 0697467

Claims 1-8, 12, and 15-19 have been rejected under 35 U.S.C. §103(a) as being unpatentable over EP 0697467 ("EP '467"). The Examiner has asserted that EP '467 teaches a method for cleaning a CVD deposition chamber comprising the steps of: a) delivering a precursor cleaning gas into a remote chamber; b) activating the precursor gas in the remote chamber to form reactive species using a microwave source of energy; c) flowing the reactive species from the remote chamber into the deposition chamber through a piping; and d) removing adhered deposits at a rate of 1 micron/minute to 2 micron/minute depending upon the particular deposit to be removed. Applications respectfully traverse the rejection.

The Examiner acknowledges that at least one element, in particular the deposit removal rate of greater than 2.0 microns/minute, is not recited in EP '467. However, the Examiner has asserted that 1) as there are no upper bounds recited, such bounds are interpreted as having a minute difference compared to the removal rate of EP '467, and 2) that a *prima facie* case of obviousness exists when ranges are close but do not overlap, such that one skilled in the art would have expected them to have the same properties.

**Appl. No.** : **10/759,925**  
**Filed** : **January 16, 2004**

As an initial point, Applicants note that one of skill in the art may not have expected the ranges in the EP '467 application and the currently recited ranges to be the same. Applicants note that obviousness between ranges only applies if one of skill in the art would have expected the two ranges to have the same properties. Here, the two ranges have different properties as EP '467 has inferior properties (lower cleaning rate) than the presently claimed method. Thus, Applicants submit that *In Re Titanium Metals Corp. v. Banner*, 778 F.2d 775 (Fed. Cir. 1985), does not apply here, as the two ranges, on their own face, clearly demonstrate different properties. Applicants note that the recited range effectively describes certain limitations of the previous elements, requiring that they result in the recited range. It is clear that the result of the method using the claimed range and the result of the method discussed in EP '467 are different, and thus, not obvious under the above theory.

Additionally, Applicants note that the technique and description in EP '467 suggests that the reported results are already at a maximal number. The Examiner presents no grounds to support the assumption that mere optimization can obtain faster etching in the method of EP '467. If anything, the opposite is suggested. For example, the experimenters in EP '467 observed that "cleaning rate for as-deposited film has reached 2 micron/minute for silicon nitride..." (emphasis added). The experimenters in EP '467 go on to note that this rate is an improvement over the previous art. This implies that the maximum rate that the experimenters reached with the process in EP '467 was 2 microns/minute and suggests that higher rates were not achieved. The presently claimed methods represent further improvement in this field. The presently claimed methods show, for example, an advantage over EP '467 in that the cleaning rates are greater than 2 microns/minute. Applicants note that this recited element, while reciting a result, places clear and definite requirements on the claimed invention, and should be given appropriate weight.

Applicants note that this applies to all of the independent claims, including Claim 12, which recite a cleaning rate for silicon oxide of, or more than, 1.5 microns/minute. Again, EP '467 suggests that the highest rate achieved for etching this material was 1 micron/minute; thus, one of skill in the art would not equate the two ranges, as one is already apparently limited by its method (EP '467) and the other appears to overcome those previously identified limitations. Similarly, this advantage is shared by the dependent claims.

**Appl. No. : 10/759,925**  
**Filed : January 16, 2004**

The Examiner is reminded that there are three requirements for establishing a *prima facie* case of obviousness, 1) every element must be taught, 2) there must be a motivation to combine or modify the elements, and 3) there must be some expectation of success that the combination or modification would work. As noted above, *In re Titanium Metals Corp.* is not applicable here, as there is a difference in the properties of the method.

Regarding the first requirement, as noted above, the elements of “greater than 2.0 microns/minute” for silicon nitride or “greater than or equal to about 1.5 microns/minute” for silicon oxide are not taught in EP ‘467. Applicants submit that the size of the difference between the rate in EP ‘467 and the presently recited rate is irrelevant, as the recited rate is above the boundaries taught in the art of record.

Regarding the second requirement, no motivation has been supplied to modify the rates in EP ‘467. Applicants remind the Examiner that the greatest rate discussed in EP ‘467 is beneath the currently recited rate and there is no indication that higher rates were achievable in EP ‘467.

Regarding the third requirement, Applicants note that no support has been provided that demonstrates that one of skill in the art would have expected the presently claimed combination to be successful. Applicants note that the language in EP ‘467 suggests that the highest rate obtained was 2 microns/minute, and EP ‘467 does not suggest that higher rates were achievable without some change, and no such change is suggested.

As none of the three requirements were adequately demonstrated, a *prima facie* case of obviousness has not been established.

Finally, as noted further below, the Applicants have also amended the claims, further distinguishing the present claims from what is taught in EP ‘467.

Rejection of Claims 1, 4, 6, 7, 12, and 19 under §103(a) over EP ‘467.

The Examiner has reiterated the arguments and further alleged that some of the claims are obvious in light of a teaching of the use of an RF power source in EP ‘467.

Applicants note that no additional information, reference, or arguments, have been provided regarding the recited cleaning rates. Thus, as noted above, these particular cleaning rates have not been taught in the reference and are not “similar” ranges to one of skill in the art. Thus, not every element has been taught by the reference. Moreover, even if a *prima facie* case had been established, it has been rebutted by the surprising results that were discussed above.

**Appl. No.** : **10/759,925**  
**Filed** : **January 16, 2004**

Additionally, as noted below, the Applicants have amended the claims.

Rejection of Claims 9-11 and 20-22 under 35 U.S.C. §103(a) over EP '467 in combination with Rajagopalan

The Examiner also rejected Claims 9-11 and 20-22 as being obvious under 35 U.S.C. §103(a) over EP '467 in combination with Rajagopalan, et al. (U.S. Patent Number 6,274,058, hereinafter "Rajagopalan"). Applicants respectfully traverse the rejection. Applicants note that Rajagopalan does not remedy the deficiencies of EP '467 with respect to independent Claims 6 and 12 (as discussed in greater detail above and in the previous Response submitted 12/20/04 to the Patent Office). Applicants note that Claims 9-11 and 20-22 depend from Claims 6 and Claim 12, which, as discussed above, are novel and nonobvious. As the Examiner appreciates, claims that depend from novel and nonobvious claims are also novel and nonobvious. As amended Claims 6 and 12 are novel and nonobvious, and as neither this rejection nor Rajagopalan do anything to refute the nonobviousness of these independent claims, dependent Claims 9-11 and 20-22 are also novel and nonobvious.

Additionally, Applicants suggest that the limitations in Claims 10 and 21 be given appropriate weight. First, the claim recites withdrawing a sealing element completely from a path. This is clearly an act and is appropriate for a method claim. However, even if this were merely a structure, the element as recited in the method claim results in a different process and flow of the gas than that shown in Rajagopalan. Some of the advantages are taught in paragraph 0021 and include, allowing for a reduction in deactivation of fluorine active species, which allows for "high-speed cleaning...."

Amendment

In the interest of accelerating prosecution, Applicants have amended the independent claims. Independent Claims 1, 6, and 12 have been amended to recite the further elements of: "wherein said dissociated cleaning gas is exposed to an aluminum alloy wall of the remote plasma discharge chamber;" "wherein the dissociation of the cleaning gas is performed in a remote plasma discharge chamber so that the plasma is exposed to an aluminum alloy wall of the remote plasma discharge chamber;" or "wherein the application of the energy is performed in a remote plasma discharge chamber that comprises a wall of aluminum alloy, wherein said fluorine

Appl. No. : 10/759,925  
Filed : January 16, 2004

active species can contact said wall," respectively. Applicants note that both of the cited references teach remote plasma discharge chambers of quartz or sapphire (col. 5, line 29 of EP '467; col. 5, line 55-col. 6, line 34 of Rajagopalan). Additionally, Applicants do not see any teaching in either of the references that suggests that the plasma be exposed to an aluminum allow wall instead of quartz or sapphire. Applicants note that this element results in a method that has several advantages that are discussed in the specification (e.g., 0024 of the published application, e.g., reduced damage, cost, reduced deterioration of electrodes, etc.). As this element has not been taught in the prior art, Applicants submit that a *prima facie* case of obviousness has not been established. Applicants request that the rejection be withdrawn and that the claims be allowed. Of course, all claims depending from the independent claims are also novel and nonobvious, as they depend from novel and nonobvious claims (i.e., Claims 2-5, 7-12, and 15-22).

#### Conclusions

In view of the foregoing amendments and remarks, Applicants respectfully submit that the pending claims are in condition for allowance and request the same. If, however, some issue remains that the Examiner feels can be addressed by Examiner Amendment, the Examiner is cordially invited to call the undersigned for authorization.

Please charge any additional fees, including any fees for additional extension of time, or credit overpayment to Deposit Account No. 11-1410.

Respectfully submitted,

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